

Full SAP Calculation Printout



Plot Reference	UNIT 14			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 14		
Plot Address	UNIT 14, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	79 C	DER	4.84	TER	18.05
Environmental	97 A	% DER < TER			73.19
CO ₂ Emissions (t/year)	0.23	DFEE	42.72	TFEE	45.41
Compliance Check	See BREL	% DFEE < TFEE			5.92
% DPER < TPER	46.91	DPER	51.55	TPER	97.10
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
Client					

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	51.6000 (1b)	2.7500 (2b)	141.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.6000		141.9000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	141.9000 (5)

2. Ventilation rate

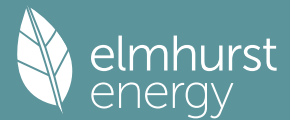
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1409 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2909 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2255 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2875	0.2819	0.2762	0.2480	0.2424	0.2142	0.2142	0.2086	0.2255	0.2424	0.2537	0.2649 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5413	0.5397	0.5381	0.5308	0.5294	0.5229	0.5229	0.5218	0.5254	0.5294	0.5322	0.5351 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
dl			2.1000	1.0000	2.1000		(26)
1			22.6900	0.7940	18.0149		(27)
exposed wall	45.1000	22.6900	22.4100	0.1500	3.3615	60.0000	1344.5999 (29a)
corridor wall	19.2500	2.1000	17.1500	0.2500	4.2875	9.0000	154.3500 (29a)
flat roof	51.6000		51.6000	0.1000	5.1600	9.0000	464.4000 (30)
Total net area of external elements Aum(A, m ²)			115.9500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 32.9239		(33)
Main dwelling							
pw			21.7250	0.0000	0.0000	110.0000	2389.7500 (32)
pf			51.6000			40.0000	2063.9999 (32a)
iw			118.2500			9.0000	1064.2500 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	7481.3499 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							144.9874 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E2 Other lintels (including other steel lintels)					10.4500	0.0500	0.5225
E3 Sill					9.4500	0.0500	0.4725

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E4 Jamb	26.1000	0.0500	1.3050
E7 Party floor between dwellings (in blocks of flats)	16.3000	0.0700	1.1410
E9 Balcony between dwellings, wall insulation continuous	1.5000	0.0200	0.0300
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.5000	0.0200	0.1100
E24 Eaves (insulation at ceiling level - inverted)	5.4000	0.0800	0.4320
E14 Flat roof	7.1000	0.1600	1.1360
E15 Flat roof with parapet	16.3000	0.5600	9.1280
E16 Corner (normal)	11.0000	0.0900	0.9900
E17 Corner (inverted - internal area greater than external area)	8.2500	-0.0900	-0.7425
E18 Party wall between dwellings	2.7500	0.0600	0.1650
E25 Staggered party wall between dwellings	2.7500	0.0600	0.1650
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.8545 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		47.7784 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	25.3486	25.2735	25.1998	24.8539	24.7891	24.4878	24.4878	24.4320	24.6039	24.7891	24.9201	25.0570	(38)
Heat transfer coeff	73.1270	73.0519	72.9782	72.6323	72.5676	72.2662	72.2662	72.2104	72.3823	72.5676	72.6985	72.8354	(39)
Average = Sum(39)m / 12 =												72.6320	
HLP	1.4172	1.4157	1.4143	1.4076	1.4063	1.4005	1.4005	1.3994	1.4028	1.4063	1.4089	1.4115	(40)
HLP (average)												1.4076	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.7373 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	23.0645	22.7220	22.2396	21.3502	20.6842	19.9458	19.5469	20.0259	20.5474	21.3376	22.2453	22.9866	(42b)
Hot water usage for other uses	32.4214	31.2424	30.0635	28.8845	27.7055	26.5266	26.5266	27.7055	28.8845	30.0635	31.2424	32.4214	(42c)
Average daily hot water use (litres/day)												50.8584	(43)
Daily hot water use	55.4859	53.9644	52.3031	50.2347	48.3898	46.4724	46.0735	47.7314	49.4319	51.4011	53.4878	55.4079	(44)
Energy conte	87.8761	76.8446	80.3879	68.7688	65.1420	57.1432	55.7219	59.1015	60.9545	69.7508	76.2031	86.7554	(45)
Energy content (annual)										Total = Sum(45)m =		844.6499	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	74.6947	65.3179	68.3297	58.4535	55.3707	48.5717	47.3636	50.2363	51.8113	59.2882	64.7726	73.7421	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	74.6947	65.3179	68.3297	58.4535	55.3707	48.5717	47.3636	50.2363	51.8113	59.2882	64.7726	73.7421	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		717.9524	(64)
Electric shower(s)	42.7227	38.0663	41.5669	39.6668	40.4111	38.5483	39.8332	40.4111	39.6668	41.5669	40.7853	42.7227	(64a)
Heat gains from water heating, kWh/month	29.3544	25.8460	27.4742	24.5301	23.9454	21.7800	21.7992	22.6619	22.8695	25.2138	26.3895	29.1162	(65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												485.9682	(64a)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	76.3580	84.5392	76.3580	78.9032	76.3580	78.9032	76.3580	76.3580	78.9032	76.3580	78.9032	76.3580	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.3882	152.9591	149.0004	140.5728	129.9344	119.9359	113.2562	111.6853	115.6440	124.0716	134.7100	144.7085	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	(71)
Water heating gains (Table 5)	39.4548	38.4614	36.9276	34.0695	32.1847	30.2500	29.3000	30.4595	31.7632	33.8895	36.6521	39.1347	(72)
Total internal gains	316.2600	325.0187	311.3450	302.6046	287.5362	278.1482	267.9733	267.5618	275.3695	283.3781	299.3243	309.2602	(73)

6. Solar gains													
[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
Northeast	5.2500	11.2829	0.5300	0.7000	0.7700	15.2296	(75)						
Southeast	17.4400	36.7938	0.5300	0.7000	0.7700	164.9790	(77)						
Solar gains	180.2086	312.0206	440.3568	568.1455	656.9273	661.2191	633.7227	566.1051	484.3941	348.4721	216.7696	153.6249	(83)
Total gains	496.4685	637.0393	751.7019	870.7501	944.4635	939.3672	901.6960	833.6669	759.7636	631.8502	516.0939	462.8851	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains from living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	28.4184	28.4476	28.4763	28.6120	28.6375	28.7569	28.7569	28.7791	28.7108	28.6375	28.5859	28.5322	
alpha	2.8946	2.8965	2.8984	2.9075	2.9092	2.9171	2.9171	2.9186	2.9141	2.9092	2.9057	2.9021	
util living area	0.9548	0.9146	0.8540	0.7475	0.6096	0.4586	0.3415	0.3816	0.5751	0.8061	0.9251	0.9621 (86)	
MIT	18.8338	19.2787	19.7925	20.3375	20.7119	20.9077	20.9709	20.9592	20.8182	20.2867	19.4514	18.7405 (87)	
Th 2	19.7502	19.7513	19.7524	19.7575	19.7585	19.7629	19.7629	19.7638	19.7612	19.7585	19.7565	19.7545 (88)	
util rest of house	0.9459	0.8990	0.8285	0.7061	0.5501	0.3805	0.2500	0.2857	0.4942	0.7627	0.9086	0.9546 (89)	
MIT 2	17.8362	18.2658	18.7533	19.2526	19.5688	19.7174	19.7538	19.7500	19.6614	19.2273	18.4458	17.7482 (90)	
Living area fraction									fLA = Living area / (4) =				0.3023 (91)
MIT	18.1378	18.5720	19.0675	19.5806	19.9144	20.0773	20.1218	20.1155	20.0112	19.5476	18.7498	18.0482 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.1378	18.5720	19.0675	19.5806	19.9144	20.0773	20.1218	20.1155	20.0112	19.5476	18.7498	18.0482 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9308	0.8809	0.8122	0.6997	0.5580	0.4011	0.2772	0.3138	0.5115	0.7542	0.8917	0.9407 (94)
Useful gains	462.1295	561.1641	610.5009	609.2396	527.0325	376.7698	249.9113	261.5705	388.6484	476.5678	460.2219	435.4473 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1011.9192	998.7678	917.1520	775.7581	596.1004	395.8228	254.5052	268.3013	427.8629	649.3063	846.9225	1008.6393 (97)
Space heating kWh	409.0436	294.0696	228.1484	119.8933	51.3865	0.0000	0.0000	0.0000	0.0000	128.5175	278.4245	426.4549 (98a)
Space heating requirement - total per year (kWh/year)												1935.9383
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	409.0436	294.0696	228.1484	119.8933	51.3865	0.0000	0.0000	0.0000	0.0000	128.5175	278.4245	426.4549 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1935.9383
Space heating per m2										(98c) / (4) =		37.5182 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	679.3026	534.7702	548.7993	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8834	0.9228	0.9037	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	600.1283	493.4610	495.9340	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1070.6996	1028.1794	950.1252	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	338.8113	397.8305	337.9182	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	84.7028	99.4576	84.4796	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												268.6400 (107)
Energy for space heating												37.5182 (99)
Energy for space cooling												5.2062 (108)
Total												42.7244 (109)
Fabric Energy Efficiency (DFEE)												42.7 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

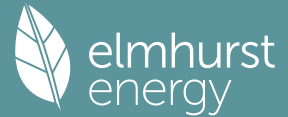
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	51.6000 (1b)	x 2.7500 (2b)	= 141.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	141.9000 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1409 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3909 (18)
Number of sides sheltered 3 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3030 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.3863	0.3787	0.3712	0.3333	0.3257	0.2878	0.2878	0.2803	0.3030	0.3257	0.3409	0.3560 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5746	0.5717	0.5689	0.5555	0.5530	0.5414	0.5414	0.5393	0.5459	0.5530	0.5581	0.5634 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type			10.8000	1.1450	12.3664		(27)
exposed wall	45.1000	10.8000	34.3000	0.1800	6.1740		(29a)
corridor wall	19.2500	2.1000	17.1500	0.1800	3.0870		(29a)
flat roof	51.6000		51.6000	0.1100	5.6760		(30)
Total net area of external elements Aum(A, m2)			115.9500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 29.4034		(33)
Main dwelling							
pw			21.7250	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 144.9874 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.4500	0.0500	0.5225
E3 Sill	9.4500	0.0500	0.4725
E4 Jamb	26.1000	0.0500	1.3050
E7 Party floor between dwellings (in blocks of flats)	16.3000	0.0700	1.1410
E9 Balcony between dwellings, wall insulation continuous	1.5000	0.0200	0.0300
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.5000	0.0200	0.1100
E24 Eaves (insulation at ceiling level - inverted)	5.4000	0.2400	1.2960
E14 Flat roof	7.1000	0.0800	0.5680
E15 Flat roof with parapet	16.3000	0.5600	9.1280
E16 Corner (normal)	11.0000	0.0900	0.9900
E17 Corner (inverted - internal area greater than external area)	8.2500	-0.0900	-0.7425
E18 Party wall between dwellings	2.7500	0.0600	0.1650
E25 Staggered party wall between dwellings	2.7500	0.0600	0.1650

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 15.1505 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 44.5539 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	26.9075	26.7718	26.6388	26.0142	25.8973	25.3533	25.3533	25.2525	25.5628	25.8973	26.1337	26.3809 (38)
Average = Sum(39)m / 12 =	71.4614	71.3257	71.1927	70.5681	70.4512	69.9072	69.9072	69.8064	70.1167	70.4512	70.6876	70.9348 (39)
												70.5675

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.3849	1.3823	1.3797	1.3676	1.3653	1.3548	1.3548	1.3528	1.3589	1.3653	1.3699	1.3747 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7373 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 23.0645 22.7220 22.2396 21.3502 20.6842 19.9458 19.5469 20.0259 20.5474 21.3376 22.2453 22.9866 (42b)

Hot water usage for other uses 32.4214 31.2424 30.0635 28.8845 27.7055 26.5266 26.5266 27.7055 28.8845 30.0635 31.2424 32.4214 (42c)

Average daily hot water use (litres/day) 50.8584 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	55.4859	53.9644	52.3031	50.2347	48.3898	46.4724	46.0735	47.7314	49.4319	51.4011	53.4878	55.4079 (44)
Energy content (annual)	87.8761	76.8446	80.3879	68.7688	65.1420	57.1432	55.7219	59.1015	60.9545	69.7508	76.2031	86.7554 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (62)
Total heat required for water heating calculated for each month	74.6947	65.3179	68.3297	58.4535	55.3707	48.5717	47.3636	50.2363	51.8113	59.2882	64.7726	73.7421 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	74.6947	65.3179	68.3297	58.4535	55.3707	48.5717	47.3636	50.2363	51.8113	59.2882	64.7726	73.7421 (64)
Total per year (kWh/year)												717.9524 (64)
Electric shower(s)	42.7227	38.0663	41.5669	39.6668	40.4111	38.5483	39.8332	40.4111	39.6668	41.5669	40.7853	42.7227 (64a)

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Heat gains from water heating, kWh/month
29.3544 25.8460 27.4742 24.5301 23.9454 21.7800 21.7992 22.6619 22.8695 25.2138 26.3895 29.1162 (65)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 485.9682 (64a)

5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	76.5856	84.7912	76.5856	79.1384	76.5856	79.1384	76.5856	76.5856	79.1384	76.5856	79.1384	76.5856 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.3882	152.9591	149.0004	140.5728	129.9344	119.9359	113.2562	111.6853	115.6440	124.0716	134.7100	144.7085 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908 (71)
Water heating gains (Table 5)	39.4548	38.4614	36.9276	34.0695	32.1847	30.2500	29.3000	30.4595	31.7632	33.8895	36.6521	39.1347 (72)
Total internal gains	316.4876	325.2707	311.5727	302.8398	287.7638	278.3834	268.2009	267.7894	275.6047	283.6057	299.5595	309.4878 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
Northeast					2.5000	11.2829	0.6300	0.7000			0.7700	8.6205 (75)
Southeast					8.3000	36.7938	0.6300	0.7000			0.7700	93.3308 (77)
Solar gains	101.9513	176.5242	249.1338	321.4372	371.6725	374.1030	358.5452	320.2850	274.0502	197.1476	122.6356	86.9117 (83)
Total gains	418.4389	501.7949	560.7065	624.2770	659.4363	652.4864	626.7461	588.0744	549.6549	480.7533	422.1952	396.3995 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)	29.0808	29.1361	29.1905	29.4489	29.4978	29.7273	29.7273	29.7702	29.6385	29.4978	29.3991	29.2967
tau	2.9387	2.9424	2.9460	2.9633	2.9665	2.9818	2.9818	2.9847	2.9759	2.9665	2.9599	2.9531
util living area	0.9697	0.9488	0.9169	0.8505	0.7455	0.5957	0.4590	0.5013	0.6989	0.8787	0.9515	0.9738 (86)
MIT	18.6976	19.0336	19.4832	20.0519	20.5194	20.8270	20.9413	20.9224	20.7068	20.0885	19.2956	18.6388 (87)
Th 2	19.7749	19.7769	19.7789	19.7883	19.7900	19.7982	19.7982	19.7997	19.7950	19.7900	19.7865	19.7828 (88)
util rest of house	0.9635	0.9386	0.8999	0.8193	0.6911	0.5092	0.3459	0.3871	0.6197	0.8464	0.9401	0.9684 (89)
MIT 2	17.7209	18.0508	18.4888	19.0340	19.4544	19.7064	19.7782	19.7711	19.6224	19.0833	18.3196	17.6683 (90)
Living area fraction	18.0162	18.3480	18.7895	19.3418	19.7764	20.0452	20.1299	20.1192	19.9502	19.3872	18.6147	17.9617 (92)
MIT	18.0162	18.3480	18.7895	19.3418	19.7764	20.0452	20.1299	20.1192	19.9502	19.3872	18.6147	17.9617 (93)
Temperature adjustment												0.0000
adjusted MIT	18.0162	18.3480	18.7895	19.3418	19.7764	20.0452	20.1299	20.1192	19.9502	19.3872	18.6147	17.9617 (93)

8. Space heating requirement

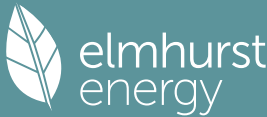
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9513	0.9232	0.8830	0.8059	0.6904	0.5282	0.3785	0.4191	0.6310	0.8333	0.9255	0.9573 (94)
Useful gains	398.0700	463.2347	495.0769	503.1188	455.2581	344.6487	237.2430	246.4832	346.8455	400.6356	390.7439	379.4748 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	980.1770	959.1846	874.9215	736.8544	568.9892	380.6600	246.7627	259.6231	410.1985	619.0696	813.9468	976.1846 (97)
Space heating kWh	433.0876	333.2783	282.6044	168.2897	84.6160	0.0000	0.0000	0.0000	0.0000	162.5149	304.7061	443.9520 (98a)
Space heating requirement - total per year (kWh/year)												2213.0490
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	433.0876	333.2783	282.6044	168.2897	84.6160	0.0000	0.0000	0.0000	0.0000	162.5149	304.7061	443.9520 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2213.0490
Space heating per m ²										(98c) / (4) =		42.8885 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	657.1274	517.3130	530.5288	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7892	0.8513	0.8254	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	518.5912	440.3956	437.8967	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	735.1293	706.5649	662.8309	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	155.9074	198.0300	167.3511	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	38.9769	49.5075	41.8378	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												130.3221 (107)
Energy for space heating												42.8885 (99)
Energy for space cooling												2.5256 (108)

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Total
Fabric Energy Efficiency (TFEE)

45.4142 (109)
45.4 (109)